



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/777,633	02/13/2004	Geoffrey Alan Scarsbrook	248810US2CONT	5368
22850	7590	04/03/2008		
OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314				
EXAMINER				
MONDT, JOHANNES P				
ART UNIT		PAPER NUMBER		
3663				
NOTIFICATION DATE		DELIVERY MODE		
04/03/2008		ELECTRONIC		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocket@oblon.com
oblonpat@oblon.com
jgardner@oblon.com

Office Action Summary

Application No.

10/777,633

Applicant(s)

SCARSBROOK ET AL.

Examiner

JOHANNES P. MONDT

Art Unit

3663

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 January 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31, 33 and 34 is/are pending in the application.
- 4a) Of the above claim(s) 2-10 and 14-30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 11-13, 31, 33 and 34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 1/8/08
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 1/8/08 has been entered.

Response to Amendment

2. Comments on Remarks filed under 37 C.F.R. 1.116 on 12/26/07 are included below under "Response to Arguments". A filing of Information Disclosure Statement on 12/26/07 is acknowledged.

Information Disclosure Statement

3. The information disclosure statement filed 12/26/07 fails to comply with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609 because:

(A) Items AJ and AS have only been provided in partial translation, yet 37 C.F.R. 1.98

(a) (2) (i) requires a legible copy of each foreign patent;

(B) Items AU and AV fail to comply with 37 C.F.R. 1.98 (b) (5) according to which

"[E]ach publication listed in an information disclosure statement must be

identified by publisher, author (if any), title, relevant pages of the publication,

date, and place of publication". In particular, no publisher, no author(s), no date and no place of publication are listed.

Therefore, a comprehensive acknowledgment of said Information Disclosure Statement cannot be issued at this time. See, however, a copy of a signed statement on Form PTO-1449, which is herewith enclosed.

The Information Disclosure Statement has been placed in the application file, but the information referred to therein has not been considered as to the merits. Applicant is advised that the date of any re-submission of any item of information contained in this information disclosure statement or the submission of any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the statement, including all certification requirements for statements under 37 CFR 1.97(e). See MPEP § 609.05(a).

Claim Objections

4. ***Claims 1, 11-13, 31, 33 and 34*** are objected to because of the following informalities: "x⁻¹" on line 10 should be replaced by "s⁻¹". Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. ***Claims 1, 11-13, 31, 33 and 34*** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter not described in the specification in such a way as to reasonably

Art Unit: 3663

convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Specifically, the claimed product value of mobility times lifetime introduced by amendment in claim 1 (line 7) has not been disclosed in the original specification including original claims, but instead some dependence on N appears to be included in the written description. Hence said value constitutes new matter.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. ***Claims 1, 11-13, 31, 33 and 34*** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, because the claimed product of mobility times lifetime introduced by amendment in claim 1 (line 7) constitutes new matter, the metes and bounds of the claim are not well defined, rendering the claim indefinite.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. **Claim 1** is rejected under 35 U.S.C. 103(a) as being unpatentable over Kitabatake et al (5,328,855) in view of Collins (5,981,057). The rejection is provided subject to the noted indefiniteness under 35 U.S.C. 112, 2nd paragraph, see section 7 overleaf. Examiner assumes "N" to mean the unit of inverse Volt rather than a physical parameter.

Kitabatake et al teach a crystalline diamond (their method efficiently annihilates defects in crystals: see col. 1, l. 48-53) prepared by CVD (col. 5, l. 65). Kitabake et al do not necessarily teach the limitation "single crystal". However, it would have been obvious to include said limitation in view of Collins, who, in a patent on a CVD diamond, hence analogous art, teaches the CVD diamond in one embodiment to be a single crystal CVD diamond (col. 2, l. 28-29). In said embodiment said CVD diamond inherently meets at least characteristic (ii) as claimed because no nitrogen was used in at least one embodiment (which uses as inert gas hydrogen instead of nitrogen: see col. 1, l. 43-53), hence, since no nitrogen was available to the diamond during growth no nitrogen could have penetrated into said diamond and hence the nitrogen impurity level cannot be greater than 300 ppb, which, together with the "annihilation of defects" and single crystal property, implies the conditions for said characteristic (ii) are met according to applicants' own Specification. See in particular paragraph [0077].

Furthermore, the hole mobility is an inherent intensive property of matter, defined at a (physically infinitesimal) point. Therefore, this property is a property of monocrystalline diamond, and as such has been measured and reported as a function of temperature, as witnessed by Reggiani et al (Phys. Rev. B 23(6), 3050-3057 (1981)),

Art Unit: 3663

- cited here for establishment of fact rather than teaching, yielding at about 300 K values for the hole mobility greater than $2100 \text{ cm}^2/(\text{V.s})$ in natural crystals of diamond (see II. Samples, Experimental Technique and Results, pp. 3050-3051, and Table I). Because said mobility is an intensive property of matter these values are considered inherent to crystalline diamond and thus an inherent property of the single crystal diamond of the combination. Hence property (iv) is met also.

As is evident from Collins the selection of poly-crystal or single-crystal embodiments is available to one of ordinary skill in the art and does not lead to any unexpected results. Moreover, the selection of a single crystal rather than a poly-crystal merely removes grain boundaries, and thereby impediments to mobility and lifetime. Applicant is reminded in this regard that it has been held that mere selection of known materials generally understood to be suitable to make a device, the selection of the particular material being on the basis of suitability for the intended use, would be entirely obvious. In re Leshin 125 USPQ 416.

Finally, the limitation "prepared by CVD" is a product-by-process limitation. The limitation "single crystal diamond" followed by a method step ("prepared by CVD"), is only of patentable weight in as much as the method steps distinguishes the final structure, and to the extent not impacting final structure are taken to be product-by-process limitations and non-limiting. A product by process claim is directed to the product per se, no matter how they are actually made. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claimed in "product by process" claims or not.

11. **Claims 11, 12, 31 and 34** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitabatake et al and Collins as applied to claim 1, in view of Sussmann et al (WO 99/64892). As detailed above, claim 1 is unpatentable over Kitabatake et al in view of Collins. Kitabatake et al do not necessarily teach the further limitations as defined by claims 11, 12, 31 and 34. However, it would have been obvious to include said limitations in view of Sussmann et al, who, in a patent document on a detector application of a thick monocrystalline diamond layer (title, abstract and "Summary of the Invention", and see second example of layer 12, on page 8), teach the thick diamond layer to have a collection distance of a magnitude that depends on the application, varying at least from 20 μm , to typical values of 50 μm and possibly up to 300 μm or more (see "Description of an Embodiment", page 4); from which it is clear that the value of the collection distance is in essence a design parameter. Applicant does not explain, in the Specification, why the difference between "more than 300 μm " on the one hand, and greater than 400 μm " or "greater than 600 μm " on the other hand, is critical to the invention. Applicant's disclosure does not teach why the range as claimed is critical to the invention. In view of the absence of a teaching why a range is critical to the invention Applicant is reminded that it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233. Furthermore, Sussmann et al teach the advantageous use of monocrystalline CVD grown diamond (second example of layer 12: page 8) in an electronic element, in particular a radiation detector, hence: detector element (see title, abstract). *Motivation* to

Art Unit: 3663

include the teaching by Sussmann et al for its specific application of the CVD grown diamond by Kitabake et al derives immediately from the suitably high mobility and collection distance required for this application, for which said single crystal CVD diamond is suitable.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Omum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

12. **Claim 1** is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over either claim 4 or claim 5 of USPAT 7,128,974 B2 (to Scarsbrook et al).

An obviousness-type double-patenting rejection is appropriate where the conflicting claims are not identical, but an examined application claim is not patentably distinct from the reference claim(s) because the examined claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d

2010 (Fed. Cir. 1993); In re Longi, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985).

Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 1 is fully anticipated by claim 4 of the allowed claims in 10/739,014.

13. **Claim 1** is provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 5 of copending Application No. 11/486,421. The reasons are identical to those put forward in support of the obviousness double patenting rejection of claim 1 in view of either claim 4 or claim 5 in USPAT 7,128,974 provided above.

This is a provisional obviousness-type double patenting rejection.

Response to Arguments

14. The Request for Reconsideration filed 12/26/07 is not persuasive for the following reasons:

(1) On 35 USC 103(a) rejections: Counter to applicant's allegation (page 3 of Remarks) that the cited portion in Kitabatake et al discloses a diamond with nitrogen because CVD was used to produce the diamond in the first place while Kitabatake et al disclose only "a post synthesis", said post synthesis is clearly disclosed not to include any nitrogen in at least some embodiments (see cited portion, col. 1, l. 43-53) and also clearly states that "the defects in the diamond crystal can be **annihilated** efficiently". That, as applicant proceeds, there must be a carbon source, is evident. However, why

Kitabatake et al would have to conform to applicant's preference as to embodiment applicant does not explain.

On applicant's arguments about his interpretation of the use of the term "defects", and the accompanying allegation that Kitabatake et al "focuses" in his patent "only on non-diamond carbon" (see Remarks, page 4), see, e.g., title, and abstract, to attest the focus on diamond rather than non-diamond, while, for what Kitabatake et al mean by "defects", see "Background of the Invention", col. 1, l. 23-40, for evidence that Kitabatake et al actually focus on the kind of defects introduced by the addition of foreign atoms (through implantation), from which it is clear that annihilation of "the defects" reasonably means no nitrogen-induced defects in the crystal lattice. That, with reference to applicant's argument on page 4, first paragraph, a graphite peak still appears in the Raman spectrum does not refute at all the absence of nitrogen. Therefore, said arguments are not persuasive.

Applicant's argument (page 4, final paragraph, that Kitabatake et al "is not a synthesis method" is not persuasive: only the end result counts.

Applicant's argument traversing combinability of Collins and Kitabatake et al is not persuasive because both Kitabatake et al and Collins are drawn to CVD diamond on account of which they are analogous art. As mentioned in the Office Action, Collins serves to show the selection of poly-crystal and single-crystal materials both are available to one of ordinary skill in the art, while the advantages on mobility removal of grain boundary effects are well known in the area of semiconductor diamond. Applicant's allegation that even when combined the "result would not be the presently-

claimed invention" apparently refers to the arguments on page 3 and 4, which have already been discussed overhead, because no new arguments are presented (page 5, lines 1-2).

Applicant's additional comments (page 5) on examiner "erroneous findings", in particular that removal of grain boundaries removes impediments to mobility and lifetime is logically deficient, because that competing crystal defects also have a large impact on the characteristics of the material does not at all detract from the positive effects of removal of grain boundaries on mobility and lifetime. Applicant's traverse of the conclusion of the "present invention is not a "mere selection of known materials generally" as such material was not previously known" hinges on whether "such" material would have been obvious. Finally, applicant's argument in traverse of Sussmann et al is not responsive to the reasons for relying on Sussmann et al and hence is discarded. The rejections under 35 USC 103(a) are therefore maintained.

(2) On Double Patenting Rejections: applicant's argument is based on an additional limitation on thickness in the patent claims not found in the instant application. However, the obviousness rejection is an anticipation-type obviousness rejection: the claim in the patent can be, and is, narrower than claim 1; however said patent claim still anticipates the claim in the application. Therefore, the double patenting rejection also stands.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOHANNES P. MONDT whose telephone number is (571)272-1919. The examiner can normally be reached on 8:00 - 18:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack W. Keith can be reached on 571-272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Johannes P Mondt/
Primary Examiner, Art Unit 3663